

# KEUFFEL & ESSER CO.

## DRAWING MATERIALS AND SURVEYING INSTRUMENTS.

CHICAGO. SAN FRANCISCO. ST. LOUIS.

### TABLES FOR EXCAVATIONS AND EMBANKMENTS.

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.  
ROADWAY 18 FEET WIDE. SIDE SLOPES 1 TO 1.  
FOR SINGLE TRACK EXCAVATION

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	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	0
1	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	1
2	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	2
3	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	3
4	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	4
5	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	5
6	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	6
7	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	7
8	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	8
9	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	9
10	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	10
11	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	11
12	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	12
13	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	13
14	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	14
15	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	15
16	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	16
17	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	17
18	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	18
19	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	19
20	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	20
21	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	21
22	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	22
23	32.0	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	23
24	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	24
25	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9	25
26	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8	35.9	26
27	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7	36.8	36.9	27
28	37.0	37.1	37.2	37.3	37.4	37.5	37.6	37.7	37.8	37.9	28
29	38.0	38.1	38.2	38.3	38.4	38.5	38.6	38.7	38.8	38.9	29
30	39.0	39.1	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.9	30
31	40.0	40.1	40.2	40.3	40.4	40.5	40.6	40.7	40.8	40.9	31
32	41.0	41.1	41.2	41.3	41.4	41.5	41.6	41.7	41.8	41.9	32
33	42.0	42.1	42.2	42.3	42.4	42.5	42.6	42.7	42.8	42.9	33
34	43.0	43.1	43.2	43.3	43.4	43.5	43.6	43.7	43.8	43.9	34
35	44.0	44.1	44.2	44.3	44.4	44.5	44.6	44.7	44.8	44.9	35
36	45.0	45.1	45.2	45.3	45.4	45.5	45.6	45.7	45.8	45.9	36





Jan 18, 1914

Elevations of New Center line plugs

+5 Sta	+5 Rod	H.T.	-5 Sta	-5 Rod	-5 El.
5503	12401	-190	120.11	6297	-395
					12406

6293	-341	123.52
------	------	--------

6448	-423	124.34
------	------	--------

6549	-321	123.32
------	------	--------

6607	-370	123.81
------	------	--------

Bread 6697 ft. 0 - Ditch at 6614

Sucker pipe 6442

4" line to end of Ditch

Permanent track laid to 6552

Turned west at 10.15 at 8 AM Jan 19, 1914 same

Completion of Williams contract

Bread left at 6697 Total Advance 975 ft

Ditch " " 6614 (83 ft from B)

Permites " " 6552 (145 ft from B)

Sucker pipe " " 6442 (255 ft from B)

4" Air line " " 6617 (80 ft from B)

Last 5 ft of Bottom 6" high

Feb 4, 1914

Tunnel pair h = 119 3 PM } Measured by

Feb 5 1914 noon } Friendly

h = 126

Elevations

Turned El

Dist down

Old line plug

11573

779

11612

8.22

The 8.50

11637

6.95

The 7.00

11652

7.29

Temp rail 7.00

Beginning of New West Tunnel Co contract

Bread at 6697

Ditch at 6614

Sucker pipe at 6602

Permites at 6607





# Tunnel work

Went back out by the shore on Feb 20 1914 and one side removed, giving end connection on one side only.

Gauge on Feb 21 at 1 PM.  $h = 114$  corrected  $h = 117$

Measurement on Feb 22 at 9 AM by alt. friendly.  $Q = 1200 \text{ SF}$

$h$  (corrected) =  $116 - Q = 11.85 \text{ sec. ft.}$

$Q$  taken from rising curve drawn by the shore of U.P.B. Co.

March 2, 1914. Monthly estimate for Feb.

Breast at 671. Advance  $\approx 274 \text{ ft.}$

Dist. between 6830. Advance  $\approx 16 \text{ ft.}$

Reinforcement track - 6790. "  $183 \text{ ft.}$

Sucker pipe at 6760. "  $158 \text{ ft.}$

## Geology -

At 6719 granite appears with normal dip of  $\pm 25^\circ$  to the NW and contains for 75 ft. corresponding to a bed approximately 30 ft. thick. Narrow beds of lime appear in the granite.

From 6795 to Breast formation is similar to that exposed there by Williams & containing  $\text{Ca}^{++}$  - hard lime of good breaking quality. Stands well and requires no timber.

Numerous fissures and open water courses strike across the tunnel and dip  $70^\circ$  SE. These fissures carried water under heavy pressure when first struck but during the month they have dried up above the ditch level. They are still producing water from below. The breast is dry.

Tunnel No. 1 - 3/2/14 - 4:30 PM.  $h = 112$   $Q = 1156 \text{ sec. ft.}$

End connection on inside only - incomp. to

Length of water -  $\approx 53 \text{ ft.}$

To measure  $h$ , take gauge readings by

distance between brass pivots and

subtract 0.2 ft. for the head.

Distance from Breast 141 ft

18 ft. The under 6761 - 7280 ore

211 ft.



Time to A.	Admiral's	Tide	Height
116.90	82.9	7.80	-0.0769h.
117.10	6.51	7.81	5.75
117.39	7.46	7.81	0.76
117.69	7.72		

Wet in tide and dry. Start working at 11.00

March 26, 1914

- Elevations -

+S. Sta	+S. Rod	H.I.	-S. Sta	-S. Rod	-S. Elev.	True Tie El
124.85 69.54	-169	123.16	70.77	-2.25	125.41	117.69
			71.64	-2.36	125.52	117.91
			71.57	-1.84	125.00	117.89

Breast at 7183 at 11 AM.

Ditch at 7087

Ties at 7000

Sucker pipe at 6982

Tunnel weir at 1:30 PM. (snowing)

$$h = 1.09 \quad Q = 10.72 \text{ sec. ft.}$$

April 2, 1914

Breast at 7269 at 4 PM. Advance 298 ft.

Ditch broken to 7155 - mucked to 7100 - 114 ft. from Br.

Ties to 7092 - 127 ft. from Br.

Sucker Pipe at 7087 - 122 ft. from Br.

Tunnel weir at 5 PM.

$$h = 1.04$$

$$Q = 9.94$$

Elevations Water Creek Creek Ditches

Dist. above tie.

7.72 rail = 7.20

7.61 turnsheet = 7.14

7.11 screw eye in cap - not to be used unless plug 7164 is knocked out.

$$\text{Grade light under } 7164 = 2.61 - 41 = 2.20$$

$$\text{Grade light under } 7157 = 2.11 - 41 = 1.70$$

Breast is in fine grained line shale similar to that cut last month.

Breast is dripping water but there are no heavy flows. At a point 100 ft. from Breast a 2" pipe could carry a flow.

At  $\odot$  7150 large fault fissure strikes N50 E dip 65° S.

Breccia soft lime and requires timbering for 12 ft. It is dry and will not cause trouble.

At  $\odot$  7065 open water course strike N30 E Vert. N. is now dry above ditch level.

Similar one at 7080, somewhat smaller, making 20 ft. from water from SW side. Dry above track level.

At  $\odot$  7100 water course (dry) strike N70 E Dip 65° N.



April 3<sup>rd</sup> 1914.

Elevations.

+5 Sta	+5 Rod	H.I.	-5 Sta	-5 Rod	-5 Elev	Tue Tie E.I.	Pist. above Tie	Remarks
125.41								
7077	-2.10	123.28	7164	-2.28	125.56	117.91	7.65	Temporary rail 7.14
			7255	-1.82	125.10	118.14	6.96	Temporary rail 6.70
Breast at 7275.5								

Grade lights under 7164 2.32  
under 7255 1.66

April 16, 1914

Elevations

125.56								
7164	-2.35	123.21	7255	-1.88	125.09	118.14	6.95	Permanent tie <del>6.66</del> OK. Screw eye in cap for grade
			7312	-2.91	126.12	118.28	7.84	Temporary rail 6.86
			7382	-2.27	125.58	118.45	7.13	Temporary rail 7.07

\* N.B. Probably wrong. Rod read by S.G. Taylor 2.91  
should probably be 1.91. To be tested with grade lights  
and not used unless it checks with one of these figures - 2.56 or 1.56  
(1.56 or 2.56)

Grade lights given 7255 = 1.66  
7382 1.84  
7312 1.56 or 2.56

Breast at 7400

April 12 7269

Advance 131 ft.

Ditch at 7282 - 118 ft from Breast.

Ties at 7255 14.5 ft from Br.

V. pipe at 7225 17.5 ft from Br.

Tunnel water - corrected Brass plates  $h = 1.03$  ft.

pencil mark to Brass plate  $h = 1.00$  ft.

Stoner says latter is correct since it is the datum used to  
construct his rating curve. From it  $Q = 9.30$  sec. ft.



April 28, 1914 Elevations						True Tie El	Dist above tie
+S Sta	+S Rod	H.I.	-S Sta	-S Rod	-S Elev		
125.56							
7164	-2.70	122.86	7382	-2.65	125.51	118.45	7.06
			7463	-2.60	125.46	118.66	6.80
		Turnsheet 20 ft from Breast		+4.15	118.71	118.84	
		Breast at 7536 Adv. 267					
		Ditch at 7422 - 114 ft from Bv					

Tunnel Weir  $h = 1.015$   $Q = 9.55$  sec ft.

Lavigne Creek gage = 0.644 Rocks in weir have flat top

Snake Creek weir full of rocks.

May 2 1914

Breast at 7521 at 9 AM.

April 2 = 7269

Advance = 312 ft.

Ditch 108 ft from Breast = 7473

Ties at 7428 = 153 ft from Breast

Smoke pipe at 7335

Tunnel weir 11 AM.

$h = 1.018$   $Q = 9.58$

Elevations					
125.56					
7164	-1.90	123.66	7382	-1.83	125.49
			7463 (new plug)	1.79	125.45
			7563	2.14	125.80

Elevations WATER Snake Creek Ditches

At 7280 to 7315 large fissure crosses tunnel S.  $\pm$  N 25° W with variable dip. at 7290 intersects open water course on East side.

From 7290 to 7320 timbered.

Small watercourse at 7340 - 2 sets of timber.

Bedding dip variably to N 8° E. At 7332 dip 3° SE

Small vertical watercourse at 7405 Beddings normal at 7415

At 7450 vertical watercourse crosses tunnel east wall 100 ft from Bv.

Beddings flat from 7430 to 7550. 7550 to Bv. irregular.

Hard line with bands of chert.

7.04 Tie = 6.85

6.79 Temp. rail = 6.9

6.89 Temp. rail = 6.8

Grade lights given under 7462 = 1.54  
7563 = 1.64

May 11, 1914						
Elevations						
+S Sta	+S Rod	HI	-S Sta	-S Rod	-S Elev	Tratta El.
125.49						
7382	1.71	123.78	7463	1.69	125.47	118.66
			756 (new plug)	2.04	125.82	118.91
			7650	2.80	126.58	119.12

Dist. in direction  
 6.81  
 6.91  
 7.46

Breast at 7669.  
 Tunnel weir at 2.45 PM.  $h = 1.04$

May 13, 1914  
 Breast at 7702 at 7.30 PM. (Dry)  
 Sample 5 ft from Breast on Contact Grey & Black Limestone.  
 Black Limestone impregnated with pyrite. Ore occurs in  
 knife blade fissures parallel to the tunnel and in specks in  
 the grey limestone.

Assay - Pb. 9.9%  
 Cu 0.12%  
 Ag 3.40 g  
 Au - trace  
 Zn 3.3%  
 Fe 3.1%  
 SiO<sub>2</sub> 65.4%

May 14, 1914 8 AM  
 Tunnel weir  $h = 1.06$

May 18, 1914  
 Tunnel weir  $h = 1.01$  (measured by Friendly.)

Elevations WATER SHAKE LIVING WATER DIST. IN DIRECTION  
 Creek Creek



Elevations Water Creek Green Ditches

May 22, 1914

Elevations

+S Sta	+S Rod	H.I.	-S Sta	-S Rod	-S.E.I.	Tie tie El
El=125.47 7463	-1.06	124.41	7563	-1.42	125.83	118.91
			7650 <sup>hand</sup> plug	-2.24	126.65	119.12
			7680	-2.23	126.64	119.20
			7780	-2.60	127.01	119.45

Brest at 78.09 - Adv 22.8

Ditch at 77.19

Ties & sucker pipe at 76.50

Tunnel weir May 21 6 PM h = 1.03

May 22 11 AM h = 1.02

Larena weir h = 0.909 (uncorrected) M.

May 27, 1914

Tunnel weir h = 1.00 (measured by Friendly)

June 2, 1914

Elevations

El=125.23 7563	-1.18	124.65	7780	240	127.25	119.45
			7919	278	127.43	119.80

Br at 79.51 Adv 37.0

Ditch at 78.70

Ties at 78.30

V Pipe at 77.90

6.92  
7.53  
7.44  
7.56

Permanent tie = 7.20

Temporary tie = 7.40

" " " 7.40

Grade lights = 2.56 - 30 = 2.26 (7780)

2.44 - 30 = 2.14 (7680)

2.53 - 30 = 2.23 (7780)

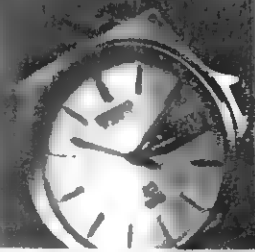
7.60 Perm tie = 7.30

7.63 Temp tie = 7.35

Grade lights 2.60 - 20 = 2.40 (7780)

1.63 - 20 = 2.43 (7919)

Grade tie under M 19 = 7' 5 1/4  
(given to Hancock)



Tunnel weir - June 10, 1914  
- 10:30 AM.  $h = 0.99$   $Q = 9.28$

- Elevations -

+S Sta	+S Rod	HI	-S Sta	-S Rod	-S Elev	True Tie E.
El = 125.83						
7563	-1.06	124.77	7780	-2.30	127.07	119.45
			7919 (new plug)	-2.83	127.60	119.80
			8037	-2.88	127.65	120.04

Breast at 8052 Advance 101 in 8 days

Ditch at 7960

✓ Pipe at 7920

June 20 1914

- Elevations -

El = 125.83						
7563	-0.99	124.84	7919	-2.75	127.59	119.80
			8040 (new)	-2.85	127.69	120.10
			8171	-3.67	128.51	120.43

Breast at 8186 Advance 235 in 18 days

Ditch at 8085

Ties at 8040

✓ Pipe at 7990

A 8000 ft brass plug cemented into E well

2 ft above ties marked 8000. Plugs 8040 & 8171

measured from 8000 ft plug with 300 ft Luffin tape.

Tunnel weir  $h = 0.97$  1 P.M.

Elevations

Snake Creek

Snake Creek

Ditches

Run tie 760. 01

Sheet 79

280 + 10 = 290  
256 + 10 = 266

Run tie + 750

Next on turn sheet

under 8171 = 3.08

under 8040 = 2.59



July 1, 1914

Elevations

1-12759

7919

-232

125.37

80.40

-242

127.69

120.70

81.71

326

128.58

120.43

8292

290

128.17

120.73

7.59

To 2.50

8.10

The water 8171 = 8.11 OK.

7.44

High on transverse.

Estimate for June.

Measured on July 1<sup>st</sup> Estimated for July 2.

Burst at 8307 July 1<sup>st</sup>.

Advance to July 2 - 13.

Burst at 8320 July 2<sup>nd</sup>.

79.51 June 2.

Advance

369 ft.

Ditch at 8223

Ties at 8191

V pipe at 8163

1" line at 818 (Kippin)

July 2 - 1914

Burst in blacky grey line medium sand.

at 808225 to 808240 - a stop to water.

Formation at this 0 is taken up

July 16<sup>th</sup> 1914  
Elevations

+Sta	+Srod	-Ssla	-Srod	-SElev
8171	3.29	8292	2.92	128.16
		8436	3.32	128.96
Br at		8453		

July 29, 14

+Sta	+Srod	HI	-Sta	-Srod	-SElev
128.16 8292	174	126.48	8436	-2.53	128.95
			8576	-2.56	128.98
Br at	8620				121.44

Advance 300

To check movement in concrete.

82996	-1.344	8982	-1.420
		2964	1.432

Three plugs on line at bridge crack in concrete.

Aug 2 1914

Elevations				
128.16 8436	-3.33	125.62	8576	-3.36
			8658	3.33
				128.95
				121.44
				121.65

Br at 8667 Advance 347 ft  
Ditch at 8565  
Ties at 8506  
V Pipe at 8460

Elevations Water Snake Landing Creek Measurements Ditches

120.73  
121.09

7.42  
7.87

7.86 Permanent Tie = 7.92 (8 1/4" rod)  
7.54 Temp. Nail = 7.94 (8 1/2" rod)

7.54  
7.30 Turn sheet = 7.72

40 ft from Br at small fissure. Fills across the tunnel with 10 feet of tough white sugary material to SE (sample)  
Br at is in grey zone of good standing and during fracture small amount of water in Br at.  
No timber down 11 month



Tunnel Wier readings					
Date	hr	h	0	m	sec
July 1	9	Am	101	9.50	1.04 9.95
2	10	"	100	9.30	
3	9	"	102	9.65	
4	10	"	101	9.50	
5	12	"	100	9.30	
6	8	"	100	9.30	
7	9	"	100	9.30	
			7	1585	7
				9.41	66.30
					9.47

New measurements gauges are being put in for tunnel and Lake Creek. No readings were taken on Lake Creek or Savina Creek during the month. Will start taking readings in about 3 days.  
 (signed Taylor)

Elevations Aug 14, 14					
128.95					
P436	186	127.09	86.58	-189	128.98
			87.91	-213	129.22
					121.65
					121.98

7.33 Permanent tie = 7.30 G.T.  
 7.24 Temporary rail = 7.35

At 2797 (66 ft NW of H.P.) there are shales across tunnel, about due E & W and dips  $\pm 75^\circ$ . This is filling 1/4 thick of blue limestone with black speckles which makes it look like porphyry. It becomes completely in doubt.

Elevations Aug 20, 14.

128.16  
8292

-1.80

126.36

8658

-2.63

128.99

121.65

7.34

8791

-2.88

129.24

121.98

7.26

Tie = 7.20

8896

-3.25

129.61

122.24

7.37

Top of Fall = 7.74

Bread at 8920

Ditch at 8820

See 8791

Sept 2, 1914.

Brass plug marked 9000 placed. 24 ft above rail in north East wall at 9000 ft from portal.

Measured from 8000 ft plug with 300 ft left in top.

Bread at 9086 11 AM.

Aug 2, 8667

419 ft Advance.

Ditch at 9005

Back 81 ft from Bread

See at 8961

" 125 " "

V Pipe at 8911

" 175 " "

Elevations

128.99  
8658

-1.92

127.07

8791

-2.19

129.26

121.98

7.28

8894

-2.55

129.62

122.24

7.38

Perm tie = 7.44

9051

-2.63

129.70

122.63

7.07

Fall = 7.7

Tunnel wall 6 = 0.48

Elevations WATER SHAKE SAWING WATER DITCHES  
CREEK CREEK MEASUREMENTS

Geology - At 8915 beds slightly tilted to north and lime is marlized. Imbedded from 8915 to 8925 a slight movement to beddings makes ground slough at this point. It is not heavy.

At 8970 there has been considerable movement to beddings which dip 10° N.

From this point to head ground gradient becomes steeper. Bread is highly metamorphosed and extremely hard and dense. In places there are thin layers of igneous intrusions. Contact metamorphic minerals frequent (as sampled) very little distinctly igneous rock as yet.

No water struck this month. Bread dry and dusty.